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Hypoxylon Canker of Aspen

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Hypoxylon canker, caused by the fungus *Hypoxylon pruina*, is the most serious disease of aspen known. It is present throughout the eastern range of trembling aspen and has recently been reported in the Rocky Mountain region. The disease is especially important in the extensive aspen stands of Michigan, Wisconsin, and Minnesota, where it causes serious mortality and thus is an important problem in management of the aspen type.

Hosts

Hypoxylon canker is abundant on trembling aspen, moderately common on bigtooth aspen, and rare on balsam poplar. Cankers have been observed on planted Bolleana poplar at St. Paul, Minn., and on Chinese aspen at Rochester, N. Y. Occurrence of canker on European aspen has been reported in Russia once, but the disease is unknown in the extensive aspen stands of western Europe.

Symptoms

Young cankers first appear on aspen bark as slightly sunken, yellowish-orange areas with an irregular margin. As the infection progresses, the outer bark is raised in blisterlike patches and sloughs off, exposing the blackened, crumbling cortex. Old cankers may be several feet in length and are rough and blackened at the centers, but the

newly invaded margins have the yellowish-orange appearance of a young canker. On most cankers the fungus invades new tissue so rapidly that callus formation is prevented.

Cutting into the diseased bark of young cankers or near the margin of older cankers reveals the laminated or mottled, black and yellowish-white cortex. Removal of all the bark exposes white mycelial fans in the cambial zone (fig. 1).

Older cankers kill trees by girdling the stem. Decay of the wood under cankers weakens the stem and predisposes it to breakage at the canker.

Description and Life History of the Fungus

The means by which the fungus infects aspen is not definitely known. Apparently, airborne spores of the fungus enter through wounds in living bark. A spore landing in a suitable wound germinates to produce mycelium, which invades and kills the bark. Insect wounds are reported to be commonly associated with infection. Failures to induce infection artificially by inoculating wounds with spores seem to indicate that factors other than the presence of a wound are important. Most cankers originate in the immediate vicinity of a dead branch stub or an old scar, but there is no evidence

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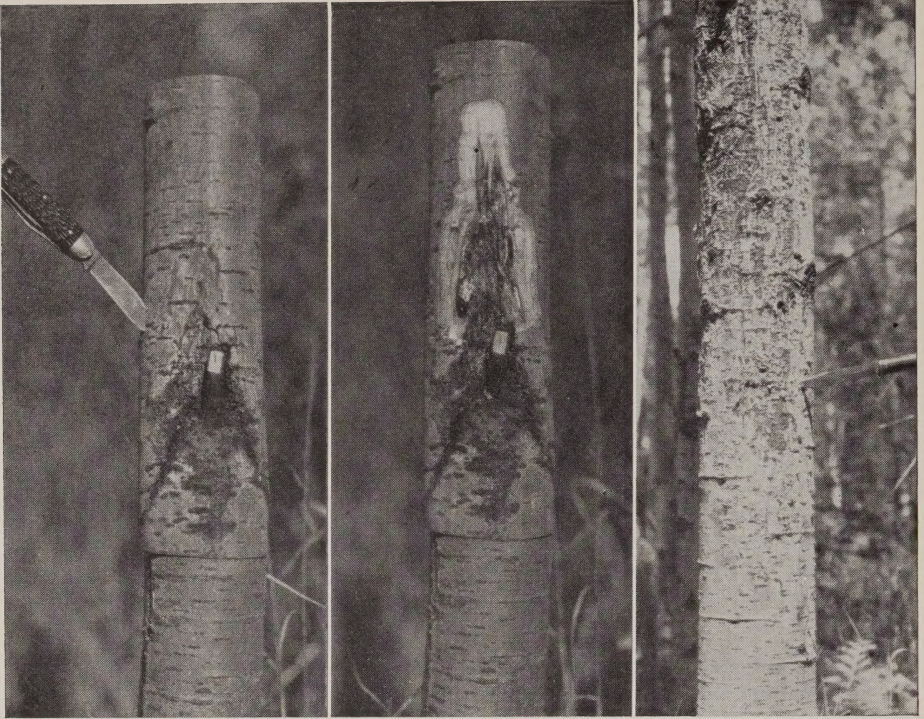


Figure 1.—A, Young *Hypoxylon* canker above dead branch stub, outer bark beginning to blister and crack; B, bark removed to reveal white mycelial fans at margins and the black, mottled appearance of the infected area. C, Large, old canker showing black and ragged appearance. Fruit bodies of *Hypoxylon pruinaum* to left of knife point.

that entrance was through the dead tissue present in such areas.

The fungus first produces asexual spores about 5 to 14 months after infection. The gray, powdery spores appear annually, from spring until early August, on small bristle-like structures under the blistered outer bark of the younger portions of the canker. About 3 years after infection the fungus produces sexual spores on the older parts of the canker. These are produced in the fruiting bodies, which are small crustlike growths ranging from a few to several millimeters in diameter. The young fruiting bodies are covered with a grayish bloom that soon disappears leaving them black. A single fruiting body can release spores every day and can continue to produce them for as many as 2 to 3 years. Whenever

the fruiting bodies become moist, the case in which the spores are enclosed opens and forcibly discharges the spores into the air.

Habits

Prevalence of the disease varies from one geographic area to another for reasons not known at present. Stands 15 to 40 years old are most susceptible to infection, but appreciable losses from the disease can occur also in the older stands. Dominant, vigorous trees and suppressed, weak trees are equally susceptible to infection. Although the percent of trees infected does not vary with site quality, damage caused by the disease apparently is greater on poor sites.

Poorly stocked stands are more susceptible to infection and serious damage than are well-stocked

stands. Not only are more of the trees infected in poorly stocked stands, but infections kill the trees more rapidly. Loss of stems in well-stocked stands due to the disease is about half that occurring in poorly stocked stands. Within a given stand about 2 to 3 times as many infections occur on trees near exposed stand edges as occur on trees within uniformly well-stocked parts of the stand. Available evidence indicates that poor stocking creates conditions favoring the fungus.

Control

No direct control measures are known. The general high prevalence of the fungus and the unknown distance to which spores are carried through the air in a viable condition indicate that sanitation measures would be costly and of questionable value. No sanitation measures have been tried.

In severely infected, poorly stocked stands canker mortality may equal or exceed growth. Early harvesting of such stands and conversion of the poorer sites to other species appear desirable. In some marginal stands, if cutting is deferred, the merchantable volume may fall below that considered operable. If partial cuts are made in better stocked aspen stands, all infected trees should be removed. Trees with evident infection die within 3 to 5 years; thus they are not potential crop trees for a future

cut, and their volume will be lost if they are not removed.

There is very little opportunity to eliminate exposed stand edges or increase stocking as a means of canker control in established aspen stands. Losses from canker in future stands probably could be appreciably reduced, however, if regeneration efforts are directed toward obtaining a well-stocked stand. Forest managers should strive to obtain uniform stocking in order to avoid the adverse effects of openings and poorly stocked patches in an otherwise well-stocked stand. A uniformly well-stocked stand is a management objective for all forest types. In aspen stands reduction of canker losses should be an added incentive for achieving the general management objective.

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